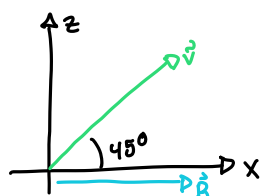


## Problems

32.P.26

a.)

$$F = qvB \sin \theta$$



$$q = 1.6 \times 10^{-19} \text{ C}$$

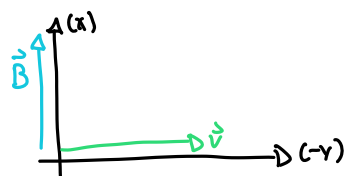
$$v = 1.0 \times 10^7 \text{ m/s}$$

$$B = 0.50 \hat{x} \text{ T}$$

$$F = (1.6 \times 10^{-19} \text{ C})(1.0 \times 10^7 \text{ m/s})(0.50 \text{ T}) \sin 45$$

$$F = 5.67 \times 10^{-13} \hat{y} \text{ N}$$

b.)



$$F = q \vec{v} \times \vec{B}$$

$$\vec{v} = \langle 0, 1.0 \times 10^7 \text{ m/s}, 0 \rangle$$

$$\vec{B} = \langle 0, 0, 0.50 \text{ T} \rangle$$

$$F = 8.01 \times 10^{-13} \hat{x} \text{ N}$$

$$F_a = 5.67 \times 10^{-13} \text{ N } \hat{y}$$

$$F_b = 8.01 \times 10^{-13} \text{ N } \hat{x}$$

32.P.28

$$B = 3.0 \text{ T}$$

$$1u = 1.6605 \times 10^{-27} \text{ kg}$$

$$f_{\text{cyc}} = \frac{qB}{2\pi m}$$

(a)  $\text{O}_2^+$

$$[r] q = 1.6 \times 10^{-19} \text{ C}$$

$$[t] m = (15.995(1.6605 \times 10^{-27} \text{ kg}))_2$$

$$[z] B = 3.0 \text{ T}$$

$$f = \frac{qB}{2\pi m}$$

$$f = 1.44 \times 10^6 \text{ Hz}$$

(b)  $\text{N}_2^+$

$$[r] q = 1.602 \times 10^{-19} \text{ C}$$

$$[t] m = 2(14.003 \text{ u})$$

$$[z] B = 3.0 \text{ T}$$

$$f = \frac{qB}{2\pi m}$$

$$f = 1.64 \times 10^6 \text{ Hz}$$

a.)  $f = 1.44 \times 10^6 \text{ Hz}$   
 b.)  $f = 1.64 \times 10^6 \text{ Hz}$   
 c.)  $f = 1.65 \times 10^6 \text{ Hz}$

(c)  $\text{CO}^+$

$$q = 1.602 \times 10^{-19} \text{ C}$$

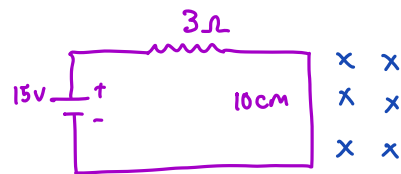
$$m = 12 \text{ u} + 15.995 \text{ u}$$

$$B = 2.0 \text{ T}$$

$$f = \frac{qB}{2\pi m}$$

$$f = 1.65 \times 10^6 \text{ Hz}$$

32.P.34



$$I = 5\text{A}$$

$$B = 50\text{mT}$$

$$F = 0.025\text{N} \uparrow$$

$$\vec{F} = I \vec{l} \times \vec{B}$$

$$F = 0.005\text{N} \uparrow (5\text{A})$$

$$\vec{l} = \langle 0, 0.1\text{m}, 0 \rangle$$

$$F = 0.025\text{N to the right}$$

$$\vec{B} = \langle 0, 0, 0.05\text{T} \rangle$$

Conceptual

32.CQ.9

- a.) The  $\vec{B}$  field would be  $90^\circ$  clockwise of the velocity vector
- b.) The  $\vec{B}$  field would be  $90^\circ$  ccw of the force vector